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Financial Reform Assoc.
(Liverpool, England)

The Advantages of a
complete decimal...

Liverpool

1855

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FINANCIAL REFORM TRACTS.

NEW SERIES, No. XII.]

[TO BE CONTINUED PERIODICALLY.]

THE ADVANTAGES

OF A

COMPLETE DECIMAL SYSTEM

OF

MONEY, WEIGHTS AND MEASURES.

BY

The Liverpool Financial Reform Association.

"I cannot doubt that a Decimal System of coinage would be of immense advantage in monetary transactions. The weight of authority on that head is altogether irresistible."—*Right Hon. W. E. Gladstone.*

"It would reduce arithmetical teaching of accounts to one fourth in point of time, and to one twentieth in point of complexity."—*Professor De Morgan.*

"The man who shall abolish the distinction between simple and compound arithmetic will be a benefactor to the present and all future generations, so long as man shall continue to be a ciphering animal, and we are by no means prepared to say that Mr. Brown is not that man."—*London Times, June 15th, 1855.*

LIVERPOOL:

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THE
LIVERPOOL FINANCIAL REFORM ASSOCIATION

WAS
INSTITUTED IN LIVERPOOL ON THE 20TH OF APRIL, 1848,

FOR THE FOLLOWING

OBJECTS:

1. To use all lawful and constitutional means of inducing the most rigid economy in the expenditure of the Government, consistent with due efficiency, in the several departments of the public service.

2. To advocate the adoption of a simple and equitable system of direct taxation, fairly levied upon property and income, in lieu of the present unequal, complicated, and expensively collected duties upon commodities.

Political partisanship is distinctly disowned, the Association being composed of men of all political parties.

ROBERTSON GLADSTONE, PRESIDENT.

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THE DECIMAL SYSTEM.

DECIMAL MONEY, WEIGHTS AND MEASURES.

The advantages, or the disadvantages, of a purely Decimal System of computation and measurement, in comparison with other systems which are either non-Decimal, or only Decimal in part, and therefore defective, may seem, on the first blush, to involve questions wholly beyond the province of a body like the FINANCIAL REFORM ASSOCIATION, whose main object is the exposure of abuses in the levying and expenditure of the national funds, in order that public opinion may be directed to the necessity of salutary reforms, both in the one and the other. The slightest consideration will, however, suffice to show that such a conclusion would not be less erroneous than precipitate. If it can be proved, as it can to demonstration, that, by the adoption of a perfectly Decimal System of reckoning, with respect to Money, Weights, and Measures, such a saving of time and labour in calculation as would enable *two* persons to do what is now the work of *five*, would be effected, that one single fact indicates such reductions in the calculating staffs of Customs, Excise, Board of Trade, and every other public Department, and also such savings in stationery, &c. (no inconsiderable items in Governmental expenses), as would serve to bring this question most strictly within the cognizance of a body associated for the purpose specified, even if its fiscal and economical importance were not attested by such authorities as those cited on the title page. Being thoroughly convinced that many benefits, social and moral as well as political and commercial, must result from the adoption of an easy and uniform mode of calculation, the FINANCIAL REFORM ASSOCIATION are of opinion that, by devoting one of their Tracts to the discussion of the Decimal question, they may contribute their quota towards its accomplishment, not only without a departure from, but in strict conformity with the objects of their institution. They, therefore, without further preface or apology, proceed to its consideration.

NUMERATION—ANCIENT AND MODERN.

In a popular essay, of the nature aimed at in this Tract, a regular treatise on Arithmetic is not to be expected, nor would it be desirable. Some preliminary observations on the general principles of Arithmetic may, nevertheless, be essential to the proper understanding of the subject: and, lest these should be considered too elementary in their character, it may be well to premise that they are intended principally for such persons as have either no knowledge of Arithmetic, or have only

learnt it by rote, without reflection,—that is to say, for very large classes of the community, who, from the mere want of such information, may be indifferent, or even hostile to the alterations proposed by the advocates of a purely Decimal System of computation. Figures are, proverbially, dry things; but they come so “home to every man’s business” that a glance at their nature and history cannot be wholly uninteresting; and it certainly will not be unimportant to show those who have never thought about the matter how these figures may be turned to the best advantage, so that very few of them may be made to do the work of a great many, thus economizing time and labour, both in the learning of Arithmetic at school, and in its subsequent application to the practical purposes of life. Everybody has some notion of the great utility of figures; but comparatively few, even of those best acquainted with them, have reflected that, by our present subdivisions of Money, Weights and Measures, we are driven to employ these same figures in processes which a better system of subdivision would render both needless and absurd, thus perverting and neutralizing, so far as we can, the great advantages which they place within our reach.

Figures are signs for words expressing numbers. Their first use must have been posterior to the invention of alphabets and written language. The earliest known use of such signs occurs amongst the Hebrews, who employed the nine first letters of their alphabet to represent the corresponding numbers. The Hebrews, and the Semitic nations generally, used the letters of the alphabet to stand for numbers. The Greeks did the same; and, that they borrowed their practice from the Phœnicians is obvious from the Greek numeral alphabet containing three Phœnician letters which have no place in their alphabet of speech. The Romans used what appeared to be, and what certainly finally became letters: but there is the strongest reason to conclude that their letters are only corruptions of a system of abbreviating marks used in actual counting. That C is the first letter of *centum*, a hundred, and M of *milie*, a thousand, is but accidental. As figures the Romans used seven letters.—I for one; V for five; X for ten; L for fifty; C for one hundred; D for five hundred; and M or CM for a thousand. By combinations of these letters they contrived to express intervening and greater numbers; by adding a direct and an inverted C to the sign for a thousand they increased its amount ten times; and by a line drawn over a letter or letters they increased the value a thousand times. By these means any particular number might be expressed, more or less cumbrously, but it is not easy to conceive how such signs could be made available for arithmetical processes. For example: the Romans had no better way of expressing eight than by means of four letters, thus VIII; for eighty-eight they required four more, thus LXXXVIII, viz. fifty, three tens, a five, and three ones. They were, in fact, driven to mechanical contrivances, when mental calculation would not serve the turn, using first, boxes of pebbles, then counters made of ivory, and, subsequently, beads strung on parallel threads, or a marked and perforated board with pegs, called an *abacus*. All the operations of simple arithmetic might be performed by means of pebbles, as, indeed, they were. Our own word *calculate* comes from the Latin *calculus*, a pebble; and the saying “*vocare ad calculos*,” to call to pebbles, or reckon exactly, was in use amongst the Romans long after they had hit upon better modes of computation. But even when these modes had been devised, the task was found so irksome and laborious that it was generally left to educated slaves and professional calculators.

The best of all signs for numbers are those now in common use which we call, though erroneously, the Arabic numerals; and of these, in conjunction with the system of Arithmetic founded upon them, it has been well observed that to calculate the benefits they have conferred upon mankind would almost exceed their own transcendent powers. The Arabs, from whom Europeans derived these numerals, had them from Persia, the Persians from India: but, as several of them have been found amongst the ancient hieroglyphical inscriptions of Egypt, some persons suppose them to be of Egyptian, not of Arabic, Persian, or Indian origin. Great, however, as is their antiquity, their introduction into Europe is comparatively of modern date, and their general adoption a matter almost of yesterday. One account is that they came first with the Moors, who invaded and conquered Spain in the tenth century. In the following age, Gerbert, a learned Benedictine monk, (afterwards Pope, under the title of Sylvester II.) visited Spain, and remained there some years, studying the sciences cultivated by the Moors. Amongst his acquisitions was a knowledge of these numerals, and the system of Arithmetic based upon them, which he afterwards disclosed to the Christian world. Gerbert thus drew upon himself, so marvellous did the results appear, the imputation of sorcery, and an alliance with evil spirits, whilst the characters themselves were looked upon as dark and mysterious things, if not as downright magic charms, with which it was both unlawful and dangerous to meddle. Another account is, that they were introduced into Europe by the Crusaders;—a third, that the later Romans were in possession of them. It is possible that all these sources contributed, but it is certain that it was not until the 13th or 14th century that they were adopted in the commercial accounts of Italy. Hence they soon afterwards made their way very generally throughout the civilized world: but it was only in the year of grace 1826 that the British Government was made to see their superiority to the savage’s expedient of notched sticks, previously used, for the purpose of account in the Royal Exchequer. To this last fact the FINANCIAL REFORM ASSOCIATION would direct the especial attention of all persons who are disposed to look to the authorities for the origination of useful reforms. The Government had to be actually badgered out of tallies into figures. It is worth while to add, as an exemplification of the difference between routine and intelligence, that the cart-loads of tallies thus rendered useless were so carelessly burnt as to set the Houses of Parliament on fire, and totally destroy them; though a yearly investigation was made in the cellars, to see that no evil disposed persons had secreted combustibles for a similar purpose!

All educated persons now are, or ought to be, familiar with these numerals and their use; but, with a view, principally, to the enlisting of the working classes under the banner of Decimal Reform, a few general observations on their nature and powers may be subservient to the main purpose of this essay, which is to shew that figures are capable of being employed to much greater advantage than they are at present. By means of nine simple signs and a cipher, standing for nothing by itself, we can express any number whatsoever. Each, by itself, represents one or more units: but place a cipher, or any figure, to the right of it, and the units become tens—two ciphers and they become hundreds—three and they are thousands, and so on, each additional cipher, or figure, increasing the value of every other figure ten times, until we get to millions, thence to billions, and still higher numbers, which may well be called inconceivable since they are quite beyond the grasp of our limited faculties.

Dealing with whole numbers only, each cipher placed to the right gives to every significant figure a tenfold value; but the addition of one cipher or ciphers to the left does not alter the value of any one of these figures. When, however, we have to deal, fractionally, with whole numbers and their parts, the cipher to the left of the parts becomes exactly as potent in the descending as the cipher to the right in the ascending scale. We separate the unit of the whole number from the figures denoting its parts by a point or dot, and then the first place after the unit denotes tenth parts, the second hundredth parts, the third thousandth parts, and so on, descending by tens from left to right, just as in whole numbers. The first three figures after the units always denote tenths, hundredths, and thousandths, which is as far as we need go, for all ordinary purposes, though we may extend the scale of diminution to ten-thousandths, hundred-thousandths, millionths, and as much further as we please. Supposing the three figures to be significant, say .324, they stand for three tenths, two hundredths, and four thousandths, or three hundred and twenty-four thousandths of the unit, whatever that may be. The addition of a cipher, or any number of ciphers to the right, has no effect on their value; but interpose one cipher to the left, between the point and the 3, and the tenths become hundredths, the hundredths thousandths, the thousandths ten thousandths; another cipher, and each figure is again diminished ten times in value, the process being capable of indefinite extension.

By this system of notation we could express, if we knew it, the exact number of atoms the earth contains,—nay,—if this globe of ours and the whole created universe were converted into one heap of the finest sand, reaching to the fixed stars, the precise number of its particles could be expressed in a line of figures less than six inches long. By means of these same figures we could designate the exact proportion of littleness borne to this huge heap by the pore of an animalcule, of which thousands live, eat, drink, and die within the compass of a single drop of water. There is nothing created so great or so small, or so numerous, the exact weight, measure, and number of which could not be accurately stated in these figures. They fail only in relation to the INFINITE and the ETERNAL. They cannot measure the greatness of the OMNIPOTENT, or the littleness of all creation in comparison with HIM; and a line of them stretching across the Earth's diameter, or round its circumference, though they might signify inconceivable cycles of ages, from the contemplation of which the finite intellect of man shrinks back, confounded and agast, could not describe the duration of Eternity—for when all shall have passed away, and millions of millions of such periods afterwards, it may still, for ever and ever, be said "NOW ETERNITY IS BEGINNING!"

ARITHMETIC—SIMPLE AND PERPLEXED.

This mode of Numeration, perfect as any thing finite can be, is purely and strictly Decimal, depending entirely upon the progression of tens, whether ascending or descending; and so is the system of Arithmetic founded upon it. In the Roman notation there are evident traces of the same system. The Greeks and Hebrews also reckoned decimally; and the root of the principle is to be found in man's ten fingers, which may very properly be called a rudimental book of Decimal Arithmetic. Of this Decimal principle, Aristotle, the great heathen philosopher, said "It seems the law of nature that ten, one hundred, and one thousand should be adopted; otherwise it is impossible to explain their universality, not only amongst civilized but amongst uncivilized nations." This was written some two thousand years ago; but Great Britain, which fancies

itself the most civilized country on the face of the earth, has not yet availed itself of the manifest and manifold advantages of this system in its subdivisions of Money, Weights and Measures; it even contains great numbers of otherwise intelligent people, who see, or imagine, all sorts of difficulties and dangers in the way of its adoption. In reality, the whole question, between the friends of rational improvement and its enemies, is just this—whether we shall give in our adhesion to what Aristotle defined to be a universal law of nature twenty centuries ago, by availing ourselves of the simple Decimal progression of ten, one hundred, one thousand, or cling to our four, twelve and twenty, otherwise 20, 240, 960, with respect to money, and an almost infinite variety of other progressions with regard to Weights and Measures.

All Arithmetic consists, fundamentally, in three rules only, Numeration, Addition, and Subtraction. The two other simple rules, Multiplication and Division, are but shorter modes of arriving at results which might be reached by continued processes of Addition and Subtraction, though with vastly more labour, and at much greater risk of error. These operations of increase or diminution might be managed by means of pebbles or counters of any kind, sufficiently numerous, especially if some of them were made to signify tens, hundreds and thousands; but little or no assistance, such as is derived from modern figures, could be rendered by numeral letters, in abstract calculations. To give some idea of the difficulties to be encountered by the Roman computer, if he attempted to proceed at all according to our fashion, here is a sum in simple Addition, set down in both modes of notation, and following, as nearly as possible, in his, the plan of placing units under units, tens under tens, and so on—

10216	CCICD	CC	X	VI
295749	CCXCIV	DCC	XL	IX
5298	ICD	CC	XC	VIII
11878	XI	DCCC	LXX	VIII
888		CCC	LXXX	VIII
827319	DCCCXXVII	CCC	X	IX
1688	M	DC	LXXX	VIII
174537	MDCCL	Id	XXX	VII
1327073	MCCCXXVII		LXX	III

The sum total of the separate numbers to the left is ascertained by an easy and simple process; but what assistance the Roman could receive from his numerals, or how arrive at the result set down for him, without the clumsy expedients already mentioned, is only matter of conjecture. But let us not triumph too much over the puzzled Roman of antiquity, for, by our modes of dealing with valuation and measurement, we, to a great extent, deprive ourselves of the advantages we have over him, and render our figures almost as unmanageable as their representatives above; and it is demonstrable that a defence of our present subdivisions of Money, Weights, and Measures, against one uniform Decimal System for all, is almost as absurd as would be the advocacy of the Roman mode of notation in preference to our own.

Arithmetic is Decimal, both with respect to whole numbers and their parts, though we are in the habit of applying the term only to those rules which deal with tenth parts, or a combination of them with integers or whole numbers. In the notation of these parts, as in that of integers, the value of every figure is denoted by the place in which it stands, each

place being a tenth part of that on its left and ten times that on its right. In the addition, subtraction, multiplication, and division of these Decimal or tenth parts, we proceed precisely as with whole numbers, the only difference being the placing of the point, and the addition of ciphers when necessary, both matters easily understood, and mere child's play compared with the difficulties which the student of arithmetic has now to encounter.

Pure, simple, and perfect Arithmetic is, therefore, founded upon immutable principles which must be, here and everywhere, now and for ever, the same. That two and two are four, twice four eight, and the fourth part of eight two, are truths to day, will be truths to-morrow,—have been and will be truths from and to all eternity. Abstract truth is always one and the same; but it may be frittered into numberless variations, all more or less related to the original; and this is precisely what we have done with Arithmetic in its application to the common purposes of life. We cannot alter the abstract principles of Arithmetic; but we can vitiate their application without limit. Each country, and every division of a country, nay every petty village, may have, and often has, its own system of Arithmetic, based on varying denominations of Money, Weights, and Measures, according to mere whim, or imaginary convenience. Thus, instead of making the first place, or column, to the right consist invariably of units, the second of tens, the third of hundreds, the fourth of thousands,—and the first place to the right of the integer tenths, the second hundredths, and the third thousandths, so that we should always have to deal with tens and tenths only, we can substitute for the simple and invariable progression of tens and tenths, 4, 12, and 20, as with our Money; 24, 20, and 12, or 16, 24, 4, and 20, as with our Weights; or 3, 12, 5½, 40, 8, 3 and 20, or 9, 36, 4, 40 and 4 as with our Measures. These are only samples of our actual vagaries; and, just in proportion to our departure from the decimal forms of Arithmetic, we have added to our own trouble, and deprived ourselves of the almost incalculable advantages we should have derived from a strict adherence to them. Had we abided by those principles, a knowledge of Numeration, and of the first four simple rules would have been sufficient for all every day purposes. We have chosen, however, or our ancestors have chosen for us, to deviate very widely from them; and the consequence has been a most cumbrous and chaotic jumble of systems, bad almost as bad can be, for if its express object had been to increase labour and the risk of error, and needlessly to sacrifice time, those objects could not have been more successfully accomplished by any means short of a recurrence to notched sticks and pebbles.

It is, indeed, hardly possible to conceive anything more complicated and barbarous than our present system, as compared with the beautiful simplicity of the Decimal Scale. In all dealings with valuation and measurement simplicity should be our guide. Were we now, with a knowledge of Decimal Notation and Arithmetic, starting afresh, and devising such matters for ourselves, not an individual would be found stupid or hardy enough to question the propriety and advantage of so dividing whatever we had to divide, that each denomination should be a tenth part of that immediately above it, so that in Money, Weights, and Measures, as in simple numbers, we should have nothing to deal with but a progression and diminution of tens and tenths. There would then have been no occasion for "Compound" rules; and none could have objected to so rational a course of proceeding, save those who thought Arithmetic too precious a thing to be left within the easy reach

and comprehension of all classes, including even children. Let us see, then, the motives we have for determining now to start afresh, and do for ourselves what ought to have been done for us long ago.

With regard to value, there are, as every body knows, two sorts of Money, viz. the money of account, which we enter in our books, and in which we make our calculations, and the money of exchange, or currency. All the moneys of account need not be represented by actual coins; but the money of exchange consists of coins which pass from hand to hand. Our money of account comprises Pounds, Shillings, Pence and Farthings, all, as it happens, actual coins: but in some countries the smallest money of account is only a nominal and imaginary thing, used in calculations. In addition to these four coins of both account and currency we have five sovereign pieces, double sovereigns, guineas, half-guineas, half-sovereigns, seven shilling pieces, crowns, half crowns, florins, sixpences, fourpences, threepences, and twopences, and we have had many others; but we do not set these coins down separately in our accounts; we simply enter them according to their value in the money of account, the guinea as £1 1s., the crown as 5s., the half-crown as 2s. 6d., and so on. The coins of account are the denominations of money which must be used in legal proceedings. A man having a debt of £16 13s. 5d. could not sue his debtor for a five sovereign piece, four double sovereigns, a guinea, half a guinea, a seven shilling piece, five crowns, three half-crowns, five four-penny and three threepenny bits, though these coins, collectively, would constitute a sufficient tender for his claim, but must prefer that claim in the legal money of account, pounds, shillings and pence.

Supposing we had a coin of account and currency as small in value as might be found necessary, ten of which should make another coin, of which ten should constitute the integer, or whole number. We should then have an *all-ten* or Decimal progression, by which all money calculations would be immensely simplified; and if the same principle were adapted to Weights and Measures, we should at once abolish the distinction between "Simple" and "Compound" rules, or, rather, supersede the latter altogether. All would then be easily understood. We should have no occasion for "Tables of Money, Weights and Measures," for "Reduction," or for a vast mass of other rubbish, accumulated solely by our departure from sound principles. With every denomination, whether of Money, Weight, or Measure, ten times more or ten times less than those immediately above and below it, all would be easy and clear as daylight to the meanest comprehension, so that even the dunce in a class at school, would laugh at the recollection of the famous quatrain which he now repeats with aching fingers and clouded brow—

"Multiplication is vexation;
Division is as bad;
The Rule of Three, it puzzles me;
And Practice drives me mad."

We have, at present, four coins of account, but instead of the three lower ones being Decimally related to each other and to the integer, there are four farthings to the penny, twelve pence to the shilling, and twenty shillings to the pound. By this clumsy contrivance Arithmetic is adulterated; its simple principles are rendered inapplicable to all monetary calculations; and we are driven, of necessity, to others, for we cannot perform a sum in addition without the assistance of division. We add up the farthings and divide the total by four,—the pence and divide by twelve,—the shillings and divide by twenty; and it is only when we come to the pounds that we proceed as with simple numbers. We thus

give ourselves a great deal of most needless trouble, both in learning Arithmetic and in its practical application. As a sample of this trouble it may be well to contrast a sum in Compound Addition, as it is called, with the same sum in another shape,—the shillings pence and farthings being turned into Decimal parts of a pound, not quite correctly but as nearly so as is necessary for the purpose of illustration—

56	14	9		56	. 737
32	18	6	$\frac{1}{2}$	32	. 927
19	12	4	$\frac{1}{4}$	19	. 619
25	19	2	$\frac{1}{2}$	25	. 959

135 4 10 $\frac{1}{2}$ 135 . 212

In the Decimalized sum the three figures to the right of the point are tenths, hundredths, and thousandths of a pound, which might, of course, have separate names as coins; but, whatever they were called, all we should have to do would be to proceed with them exactly as with simple numbers. In "Compound Subtraction" we have to keep constantly at work with the fours, twelves, and twenties, instead of dealing only with tens. With Multiplication we must combine Division, to bring the Farthings into Pence, the Pence into Shillings, and the Shillings into Pounds; and in Division we cannot get on without Multiplication, to reduce the remaining Pounds into Shillings, the Shillings into Pence, and the Pence into Farthings. A better descriptive adjective for these processes than that which we apply to them would be "Absurd" Rules; for, if we had a Decimal subdivision of money and commodities, we could add, subtract, multiply, and divide value, weight, or any thing else, exactly like common numbers.

With respect to money of account, three divisions of the integer would be sufficient, and for fractional prices, each somewhat more than nothing, and mounting up to tangible reality on large quantities, we might speak of and calculate with tenths, hundredths, or even thousandths of the smallest possible coin. We never pay less than a farthing; but some goods, cotton for example, are sold at the rate of so many eighths or sixteenths of a penny, that is, half or quarter farthings, per lb. For a single lb. the 16th of a penny is only an imaginary thing; but on 200 bales of cotton, weighing 3 cwt. each, the odd sixteenths of a penny would amount to £17 10s. The sixteenths are only elements of cumulative calculation: there is nothing to prevent but much to facilitate such calculations, in a strictly Decimal division of the Pound. If our ancestors had been wise they would have divided it into tenths, hundredths, and thousandths, leaving those who had occasion for further division to go as much lower as they pleased; but, by the sub-divisions they did adopt, they threw away the almost incalculable advantages of an ALL-TEN system, and corrupted Arithmetic by introducing different modes of numeration. In pure Arithmetic, there can be only one figure in the place of any one denomination, and that, of course, never greater than nine; but, with our Monetary divisions, the figure or fraction in the place of that corresponding with the unit, is a fourth part, instead of a tenth, of the next higher denomination; the figure (or figures,—for there may be two) in the second place, is a twelfth part of its left hand neighbour; and the figures in the third place (for here, also, there may be two, from ten to nineteen) are so many twentieth parts of the highest denomination, which brings us to unvarying tens.

With regard to Weights and Measures the matter is still worse. Here we have, indeed, confusion worse confounded,—a perfect chaos of

clashing systems of Numeration, each more difficult than the Decimal, and each rendered still more difficult by admixture with others. In what is called Avoirdupois Weight we may have to deal with a series of six denominations, viz tens, hundred weights, quarters, pounds, ounces and drams, in which the first, commencing with the lowest, consists of 16th parts of the second,—the second of 16th parts of the third,—the third of 28th parts of the fourth,—the fourth of 4th parts of the fifth, and the fifth of 20th parts of the sixth,—necessitating, in their addition, divisions by these several numbers, instead of a simple setting down of units and carrying of tens,—all that would be requisite if the subdivisions of the ton were Decimal. The absurd complexity of this table does not end even here. The hundred weight might be supposed to be what the words import, 100 lbs. but it is, ordinarily 112 lbs.,—rather a longish hundred, and it may be 120 lbs., which is called, emphatically, *the* long hundred. There is also a weight called a stone, which is, generally, half a quarter of a cwt., or 14 lbs.; but the stone ranges from 6 lbs. to 21 lbs. For gold, silver, precious stones, and philosophical experiments, we have another scale of weights, introducing grains of which 24 make one penny-weight, 20 pennyweights one ounce, and 12 ounces one pound; and yet a third scale, called Apothecaries' Weight, of 20 grains to the scruple, 3 scruples to the drachm, 8 drachms to the ounce, and 12 ounces to the pound. In these two last scales the pound, ounce, and grain are the same; but the pound differs from the pound Avoirdupois, and the latter sometimes differs from itself, for if we buy a pound of salt butter we get, or ought to get, 16 ounces, whilst of fresh butter, the pound may be one of 18 or even 20 ounces. There is a schoolboy catch "Which is heaviest, a pound of lead or a pound of feathers?" They are equal because both happen to come under one Table: but put it thus, "Which is heaviest, a pound of gold or a pound of feathers?" and a pound of one of the lightest of substances, out-weighs, by one third, a pound of the heaviest of metals. We have still further diversities in various other tables of weight and measure, each with its own system of Numeration: and it was only by legislative enactment that we were freed, a few years ago, from the crowning absurdity of different measures for ale, wine, beer, and other liquids.

Such details as these may seem trite and puerile, but they are necessary for all who have not yet given themselves the trouble to reflect on the matter, for these are the very things that make Arithmetic a puzzle, a plague, and a snare. No sooner has a boy at school mastered Numeration and the four first rules (which, if of suitable age and ordinary capacity, he may do in two or three months), than he finds, to his disgust and disappointment, that he is only at the threshold of his labours. He has obtained a clear insight into the Decimal System, though he does not know it by that name; but having accomplished this, his understanding is then bewildered by a complication of systems, all differing from that which he has learned, and from each other. Just when he should begin to apply the knowledge he has acquired, he is obliged to proceed to other principles. These create confusion in his mind, cause him to forget what he has learned, and make the subsequent application of Arithmetic to practical purposes, greatly more difficult and laborious than it need to be. The most ordinary questions of business seem beyond the power of addition, subtraction, multiplication, and division, as he has learnt them; and so they are, because Money, Weights, and Measures all depend on systems of Numeration essentially differing from that of numbers. But if Money were subdivided on the same principle there would be no trouble or perplexity at all. The boy

would see that he had to deal with Money just as with common numbers, the addition and subtraction of which would give those of Money, whilst common multiplication would give the price of many from the price of one, and common division the price of one or more from the price of quantities. And if Weights and Measures, as well as Money, corresponded with Decimal Numeration, the boy would be out of his purgatory of figures altogether, for without being obliged to learn, or refer to tables of any kind, excepting that of Multiplication, he would still have to deal with simple numbers only. As it is, the perplexities of the boy are those which beset the man throughout life, whenever he has occasion to meddle with figures. Both would derive most solid advantages from the substitution of a better system, and the man especially, for he suffers in pocket as well as in the sacrifice of time and labour, caused by that complexity of Arithmetic which makes skillful computers so rare that they constitute a profession by themselves. With a Decimal subdivision of Money, Weights, and Measures, aptness at computation would soon be as common and ordinary a thing as a perfect knowledge of the alphabet. Every man would be his own "Ready Reckoner," and all the tables with which he is now obliged to load his memory, or have at hand for constant reference, might be cast aside as so much useless lumber. Supposing that, along with the Pound sterling divided into tenths, hundredths, and thousandths, we had a pound weight of ten ounces, an ounce of ten drams, and a dram of ten grains, it is obvious that for every thousandth of a pound in the price of a grain, there would be a hundredth in the price of a dram, a tenth in the price of an ounce, and a pound in the price of a lb. weight. Such mutual connexion and relation of prices with quantities would be invaluable, for thus nineteen twentieths of all the calculations made in this commercial and manufacturing country might be effected by means of the four simple rules, and very many of them mentally, without writing down a single figure.

To show the difference between the Decimal and non-Decimal Systems let us suppose the price of 358 tons 17 cwt. 2 qrs. 14 lbs., at £97 10s per ton, to be required. This is, virtually, nothing but a sum in simple multiplication; but, under our present system most persons would invest it with all the dignity of the Rule of Three, and, at an expenditure of exactly 210 figures, they would find the answer to be £34,990 18s. 5½d. The same result might be obtained with about 100 figures by the Rule of Practice, a tedious complication of multiplication, division and addition; but here is the same problem solved, with 49 figures only, by simple multiplication:—

35888125
975
—
179440625
251216875
322993125

£34990-921875

The five figures to the left of the point are Pounds; the first to the right of it is $\frac{1}{10}$ ths of a pound,—18 shillings,—the two next are $\frac{1}{100}$ ths of a pound,—5½d. and the rest are so many thousandth parts of a farthing. Let the question be reversed,—“If 358 tons 17 cwt. 2 qrs. 14 lbs. cost £34,990 18s. 5½d. what is the price per ton?” and another Rule of Three operation, with its statement, reductions, multiplications, divisions, and re-reductions, requiring 196 figures, will show the answer to be £97 10s.

Yet this is simply a question of dividing the total amount by the whole quantity, performed, Decimally, thus in 67 figures:—

35888125/34990-921875(97-5

322993125

269160937

251216875

179440625

179440625

An examination of the Rule of Three examples in "Tutor's Assistants" will show that most of them are questions of simple Multiplication and Division, or would be so with a Decimal System. It is true that, in the shorter operations given above, the figures employed in reducing ordinary money and weights into Decimal parts do not appear: but it is to be remembered that, with Decimal Money and Weights, no such proceeding would be necessary, and that there would be no more occasion for rules to reduce Money, Weights and Measures, from one denomination to another, than there is for a rule to reduce thousands into hundreds, hundreds into tens, and tens into units.

LOGARITHMS.

In these contrasted operations are exhibited a practical illustration of the great saving in labour and figures which we might effect if we pleased; but there is another and a still greater saving which would follow the adoption of the Decimal System, and that is the adaptation of Logarithms to every day purposes. Logarithms are artificial numbers invented, some 250 years ago, by Lord Napier, of Marchistoun, and afterwards improved by Dr. Briggs, of Oxford, who decimalized them, and constructed the tables now in general use—by mathematicians and sailors. With these numbers long Multiplication is performed by Addition, Division by Subtraction, Involution by one Multiplication, instead of by half a dozen or more, and Evolution by one division. Thus:—supposing that six figures were to be multiplied by themselves, or by six others, the operation would require about 60 figures; but, referring to the tables, and finding the logarithmic numbers for the multiplicand and the multiplier, all we have to do is to add them together, and then another reference to the table, for the number corresponding with the logarithmic total, gives the product without any labour of multiplication at all. And so with division:—we have only to find, from the table, the logarithms of the divisor and dividend, subtract the one from the other, and the difference, by another reference to the table, shows the quotient, without the trouble of, perhaps, a desperately long sum in long-division. The benefit of this invention, though it is now nearly three centuries old, has, hitherto, been all but monopolized by the mathematician and the navigator, whose labour in computation it has reduced to about a tenth of what it used to be. The carpenter's rule, a thing easily understood and used with great advantage, is logarithmic; but logarithms are seldom or never applied to the shortening of business calculations, simply because our money is not Decimal. Our fours, twelves, and twenties render their application so difficult as to be practically impossible; and we are therefore, in such matters, deprived of all benefit from Lord Napier's great discovery. With Decimal Money, Weights and Measures, it might be made available to the still further simplification of Arithmetic, and there would be nothing to prevent the construction of a mercantile sliding-rule quite as simple and useful as that of the carpenter.

ENGLAND BEHIND CHINA AND JAPAN.

For all objects of value, weight and measure, we might have but one system of Arithmetic, and that the simplest and the best: we should have had it but for the ignorance of our predecessors; and the question now is whether we, knowing that the system they have left us is radically bad, and clearly seeing our way to one infinitely better, shall continue to labour on under the grievous disadvantages they have bequeathed us, or set resolutely to work to achieve our own emancipation, and that of our posterity. In this respect, at least, "the wisdom of our ancestors" was woefully at fault; but ours will be the folly if we wear much longer the doubly figurative fetters which they forged and left for us.

We are in the habit of considering ourselves an eminently practical and commercial people. If there be one thing on which we pride ourselves more than another, it is our supposed custom of bringing every thing to the standard of common sense and proved utility. This characteristic we imagine to be peculiarly British. But our subdivisions of Money, Weight and Measures, shew how egregiously we are mistaken in this estimate of ourselves, for nothing can be less practical or more cumbersome to commerce,—nothing more diametrically opposed to common sense. In this respect we are not only inferior to the Americans, the French, the Russians, the Brazilians, and many other nations that have adopted, more or less completely, the Decimal System, and are fully alive to the advantages of its extension, but we are lagards behind the people of China and Japan, who have that system, and have had it for ages. The Chinese, we know, are, or were, in the habit of calling us "red-bristed devils," and "outside barbarians!" Whatever may be thought of their sense and manners touching the first brace of epithets, there can be no doubt that, so far as our use of figures is concerned, they are perfectly right in dubbing us "barbarians."

The Chinese have availed themselves of the advantages of the Decimal System, and they are, consequently, almost to a man, expert arithmeticians; whilst with us, even amongst the best educated persons, good accountants are the exceptions to an almost universal rule. Sir John Bowring, whose residence in China has made him well acquainted with the customs and character of the people, and who is himself a very shrewd arithmetician, attributes to them extraordinary quickness and accuracy in calculation. He states that, in a Chinese school, a boy learns more of arithmetic in a month than a boy in an English school masters in a year. He describes a sort of abacus, or arithmetical scale, called the *Swan-pan*, with which, by means of balls, representing units, tens, hundreds, thousands, and also tenths, hundredths, thousandths, &c., all calculations, whether ascending or descending, can be made with the greatest facility; and he recommends the adoption of a similar instrument in England, in combination with the Decimal System, as likely to be of great advantage both to boys at school and to men in business. He states that he was himself beaten hollow, both in rapidity and correctness of calculation, by his own Chinese servant; that even working people are expert arithmeticians; that their quickness and accuracy frequently excited his astonishment; that he himself was never able to keep pace with them; and that he invariably found them right whenever there was any difference in the results separately obtained. The fruit of all Sir John Bowring's study, travel, and experience is a firm belief that the adoption of the Decimal System would be of incalculable advantage in education, and of boundless benefit in all the operations of trade and commerce. On neither point can there rest the shadow of a

doubt in the mind of any reflecting individual who will give his mind to the subject; and the only question now is, whether we will prove ourselves to be really a common-sense-loving people, or jog on contentedly in the rugged way which our fathers have laid down for us.

ORIGIN AND PROGRESS OF THE DECIMAL MOVEMENT.

The attention of scientific and practical men, in this country, has long been directed to the inconveniences and disadvantages of our present system. The first to bring the subject before Parliament was the late Sir John Wrottesley, who, in the year 1824, urged the great superiority of the Decimal System, proposing that the Pound sterling should be taken as the unit, and divided into a thousand Farthings. He did not, however, press his motion to a division. The subject again slept, so far as any public movement was concerned, until May, 1833, when a Royal Commission was appointed to consider the propriety of a Decimal scale of Weights and Measures. The Commissioners examined a great number of intelligent witnesses; and, in 1841, they reported unanimously in favour of the change, but stated that a Decimal arrangement of the Coinage was so intimately connected with that of Weights and Measures that the one would be incomplete without the other. They accordingly recommended that the Coinage should be at once Decimalized, by the division of the Pound sterling into one thousand parts. In 1843 a second Royal Commission reported in favour of a Decimal Coinage. In 1847 Dr. (now Sir John) Bowring induced the Government to take the first actual step towards Decimal Money, by coining the Florin, of 2s., being the tenth part of a Pound. In 1852 the Liverpool Chamber of Commerce, and various other mercantile bodies, memorialized the Government in favour of a completely Decimal Money of account; and early in the session of 1853 a Committee of the House of Commons was appointed, on the motion of Mr. Wm. Drown, the active and intelligent member for South Lancashire, to take the subject into consideration.

The Committee thus appointed comprised some of the ablest business members of the House of Commons, and was, in all respects, one giving to Parliament and the country the best assurance that the matter entrusted to it would be thoroughly investigated, and its decision entitled to the most respectful consideration. The Committee held fourteen sittings, of which eleven were devoted to the examination of witnesses in various stations of life, all well qualified, from their scientific attainments or practical knowledge, to give sound and valuable information. Amongst them were Mr. Thomas Hankey, Governor of the Bank of England; Mr. Laurie, a wine merchant in extensive business; Lieut. General Sir C. W. Pasley; Professor Airy, the Astronomer Royal (who was Chairman of the Commission of 1838); the Duke of Leinster; Sir J. W. Herschel, Master of the Mint; Professor De Morgan, of University College; Mr. William Miller, Cashier of the Bank of England; Mr. Rowland Hill, originator of the Penny Postage; Mr. Thomas Bazley, President of the Manchester Chamber of Commerce; Mr. Dowie, of the Liverpool Chamber of Commerce; Sir John Bowring; many shopkeepers having extensive dealings with the industrial classes and the poor; and several architects, engineers, contractors, and others employing great numbers of men at daily or weekly wages, and having extensive calculations to make in their business. Mr. William Brown a member, and generally Chairman of the Committee, was also examined as a witness, and gave valuable evidence as to the facility with which the change from Pounds, Shillings, and Pence, to Dollars and Cents was made in

America, in 1800, and that from Gold to Bank Notes in the north of Ireland, in 1809. He likewise stated his conviction that nothing more is necessary to remove all dislike to the proposed change, and all difficulty in the way of it, than to make the people of this country fully understand its nature and advantages. The Committee deliberated two days on its report, which was unanimously adopted, presented to Parliament, and ordered to be printed on the first of August, 1853.

REPORT OF THE COMMITTEE.

As this document may be considered the *avant-courier* of a change most important to all classes of the community,—a change which must come, sooner or later, and can only be delayed by the mass of ignorance and prejudice invariably opposed to all great improvements, a summary of its contents cannot but be advantageous.

The Committee state, in the commencement of their report, that the witnesses examined were men most capable of giving information on the subject of inquiry, and that all concurred as to the great superiority of the Decimal System, the only difference of opinion amongst them being with respect to the precise basis which should be adopted, and the measures necessary to effect the change with the least possible temporary inconvenience. The evidence as to the disadvantages of the present system was most clear and decided, shewing that it occasions a vast amount of unnecessary labour in calculations of all kinds, attended with great liability to error,—renders accounts needlessly complicated,—confuses questions of foreign exchange,—and is otherwise most objectionable. On the other hand, all the evidence went to prove that the adoption of the Decimal System would greatly simplify calculations of all kinds,—diminish the labour, in many cases, to the extent of four fifths,—lead to greater accuracy,—and, by facilitating the comparison between our coinage and that of countries which have adopted the system, would be greatly beneficial to all persons engaged in foreign commerce, to travellers, and others. It also shewed that the change will be found most useful in all departments of the public service, and in every branch of trade and industry, by the economy of skilled labour to which it will lead; and that education will be greatly promoted by its facilitating the acquirement of a thorough knowledge of arithmetic. Further proof of the value of the Decimal System is afforded by its adoption in various countries, with respect to Weights and Measures as well as Money. There is no instance in which any nation, having once adopted it as to Money, has abandoned it, the invariable tendency being to extend it to Weights and Measures also. In the Bank of England it was found desirable to introduce a Decimal scale of weights for the purchase and sale of bullion, in lieu of the old system of pounds, ounces, pennyweights, and grains. Parliament has legalized the alteration, of which the advantages have been found so great that the example of the Bank has been followed by all bullion dealers in the Metropolis. Professor De Morgan and other teachers give their pupils short rules for transferring common Money into the Decimal form, and then, when the answer is obtained, re-converting it into Pounds, Shillings, and Pence. There is here an obvious waste of time, but the advantage in the saving of figures is so great that it is found worth while to incur the extra labour of these operations.

The Committee state that to the general introduction of Decimal Money there are two obstacles, the first of which is the difficulty of inducing the mass of the population to depart from standards with which they are familiar, and from modes of calculation to the defects of which

usage has reconciled them;—the second the necessity of re-arranging the terms of all pecuniary obligations, depending either on parliamentary enactment or private contract, and expressed in coins which, in the event of a change, will cease to have legal currency, viz. the penny and its parts. The second of these objections seems the most serious, but it is not so in reality, because, being of a tangible nature, its details can be grappled with and overcome; whereas the other, being vague and indefinite, and based only on feeling, habit, and prejudice, not on reason or fact, cannot be dealt with on any abstract principles. But even this difficulty has been, and is, much exaggerated. Several witnesses, having extensive dealings with the working classes, and some of them accustomed to take as many as a thousand farthings weekly over the counter, were convinced that if the Farthing were altered from the 960th to the 1000th part of a Pound, in accordance with the Decimal subdivision, no prejudice would be raised amongst the poor against the slight decrease of four per cent. in the value of the Farthing, provided they were made to understand that they could get 25 of the new coins for sixpence instead of 24 farthings. With respect to the fractional parts of a penny less than a farthing, all the tradesmen examined stated that competition and the keenness of the poor invariably cause an adjustment of quantity or quality, in the articles sold, to the exact value of the money received for them. As to the supposed difficulty of effecting the change, the Committee refer to the cases of Ireland and America. In the latter country the old system of Pounds, Shillings, and Pence was entirely superseded by the Decimal division of Dollars and Cents; and in the former, the currency was assimilated to that of England, without trouble or difficulty, though the Irish fancied, for a time, that they lost a penny in every shilling by the alteration.

Prejudices of the nature mentioned by the committee are common enough; but their existence should not be allowed to impede sound legislation. They are to be met with ridicule rather than respect and serious argument. When the English statute mile was substituted for the Irish mile there were Irishmen silly enough to imagine that their country was robbed of the difference; and when the Gregorian correction of the calendar was adopted, after long resistance, here, there were Englishmen so stupid as to make a popular grievance of the striking out of 12 days from a month, and passing at once from the 2nd to the 14th, just as if the measure had, to that extent, shortened the duration of their lives.

The Committee unanimously recommend the retention of the Pound sterling as the unit, or integer of a new and better system. It is the standard associated with all our ideas of value, as well as with our whole financial history, and it is the basis of our system of exchange with all the world. Its retention also affords the means of introducing the Decimal System with a minimum of change. Its tenth part already exists in the Florin; add a coin the tenth part of a Florin, being the hundredth of a Pound, and then an alteration of four per cent. in the value of the Farthing, now the 960th part of a Pound, will convert it into the lowest step of the Decimal scale which it is necessary to represent by an actual coin, viz. the thousandth part of a Pound. It is proposed that the two new coins shall be called the Cent and the Mil, marking the relations of hundredth and thousandth to the Pound. The Money of Account would then be Pounds, Florins, Cents, and Mills, instead of Pounds, Shillings, Pence, and Farthings, as at present. Amongst the various other plans suggested to the Committee, the retention of the Farthing, at its present value, as the basis of a new currency

is mentioned as having greater advantages than any of them; but as its adoption would add a halfpenny to the value of the Shilling, and therefore to that of the Pound, this would necessitate the withdrawal of nearly all the present gold and silver coins. It would also involve an alteration in the terms of all contracts and obligations expressed in either gold or silver; and the proposal is therefore dismissed as one that cannot be entertained.

The Committee describe as the only practical obstacle to the best mode of effecting the change,—viz. that making the smallest coin the thousandth part of a Pound,—the necessity of re-adjusting all obligations expressed in the Penny and its parts, from which a considerable portion of the revenue is raised,—such as postage, newspaper, and receipt stamps, Customs duties, and also road, bridge, and ferry tolls. If, when the charge is one penny, four Mils, the nearest equivalent to four Farthings, were substituted, the change would involve a loss of four per cent. to the receiver; whilst if it were raised to five Mils the loss to the payer would be 20 per cent.—the payment being, in the one instance, the 290th, in the other the 200th part of a Pound, whilst, now, at a Penny, it is the 240th part. But the Committee do not consider the difficulty by any means insuperable. Several of the witnesses showed how it might easily be obviated. As to newspaper and receipt stamps, they may be sold at twelve for 50 Mils, the exact equivalent for a shilling. As to the Penny Postage, Mr. Rowland Hill is decidedly in favour of a charge of four Mils, instead of five, being convinced that the immediate loss to the revenue (which he estimates at £100,000) will be compensated by savings in expenses, and soon made good by an increase in the number of letters. There are various ways in which toll owners and all persons similarly situated (none of whom have objected to the proposed change) may be compensated, without loss either to themselves or the public. As to Customs duties all that is necessary to avoid loss to the revenue is to charge by the hundred pounds instead of by the cwt. [In this view the Committee have understated the case. Mr. Miller, one of the cashiers of the Bank of England, has shown that the process of ascertaining the duty on three Butts of Currants, weighing 5 cwt. 1 qr. 16 lbs., at 15s. per cwt. takes 172 figures,—which have to be checked by five or six hands, and that, in Decimals, it may be done with 24 figures only. According to Mr. Hankey, of the same establishment, the mere substitution of 100 lbs. for the cwt, and a Decimal scale of weights would save the labour of 200 clerks in the Customs alone, and salaries to the amount of at least £10,000 a year.]

The decision of the Committee in favour of a perfectly Decimal Money of account was unanimous. As to existing coins, they recommend the retention of the Sovereign, Half-Sovereign, Florin, and Shilling. They observe that Crowns and Sixpences may remain, but that the withdrawal of Half-crowns, Fourpences, and Threepences is desirable because they are incompatible with the Decimal scale. The new coins they suggest are pieces of 10 and 20 Mils in silver, and pieces of 1, 2, and 5 Mils, in copper; and they strongly recommend that all the new coins should have their value in Mils distinctly marked upon them, in order to familiarize the people with the new mode of reckoning. It was on all hands agreed that the fewer the number of coins the better, provided there are enough to facilitate payments; and that, this point being exceeded, a multiplicity of coins is a great evil instead of an advantage. Witnesses from the Bank of England stated to the Committee that the mere sorting of Half-crowns and Florins, Fourpenny and

Threepenny bits, and of other coins of nearly equal value, constitutes a very considerable portion of the labour of the clerks in that establishment. All persons have experienced more or less the inconvenience of an *excess* of convenience in this respect; and all must know how greatly it increases the liability to mistakes. The Committee consider that a certain period of preparation for the transition is indispensable; but they believe that no unnecessary delay should prevent the full introduction of the Decimal System. They urge the great advantage of applying the same principle to Weights and Measures, and conclude their report in the following terms:—

“Your Committee, having well weighed the comparative merits of the existing system of coinage and the Decimal System, and the obstacles which must necessarily be met with in passing from one to the other, desire to repeat their decided opinion of the superior advantages of the Decimal System; and to record their conviction that the obstacles referred to are not of such a nature as to create any doubt of the expediency of introducing that system as soon as the requisite preparations shall have been made for the purpose, by means of cautious but decisive action on the part of the Government.

“Your Committee consider the present moment especially adapted for introducing the Decimal System, in consequence of the prosperous state of the whole community, including those classes which would be more immediately affected by the change, and they feel the importance of not allowing such an opportunity to be lost.

“They believe that the necessary inconvenience attending on a transition state, will be more than compensated by the great and permanent benefits which the change will confer upon the public of this country, and of which the advantages will be participated in, to a still greater extent, by future generations.”

These, then, are the conclusions of the Committee,—1st, That a Decimal Money of account and currency is most desirable. 2dly, That it can be easily introduced. 3dly, That it should be introduced speedily. 4thly, That it may be introduced at one step. 5thly, That the existing Sovereign, or Pound sterling, should continue to be the principal coin of account. These are points fully sustained by the evidence. The first four may be considered settled, so far as reason goes. As to the fifth there is some difference of opinion; but the weight of authority in favour of the unanimous decision of the Committee is overwhelming. On the general question, no reflecting man can entertain a doubt that great advantages must flow from the adoption of the Decimal System. There are, however, persons who, not having given themselves the trouble to think, have a vague sort of notion that its advocates are crotchety and fanciful people who, for a mere whim of their own, wish to upset all our notions of value, and all our wonted modes of computation, sanctioned and rendered venerable by the custom of ages. Let such objectors study the matter a little, and they will find that the advocates of the change are the practical men,—its opponents the champions of mere whims and crotchets against the solid and proved advantages of a great improvement; and, furthermore, that those advantages, instead of being confined to one particular class, as they suppose, would extend to the whole community,—to every man, woman, and child who has anything to do with the computation of Money, Weights, and Measures.

THE NEW COINAGE AND THE OLD.

The Committee decided unanimously in favour of a purely Decima

Money of account and currency, comprising the Pound sterling as the unit, and its subdivision into tenths, hundredths, and thousandths. The very best names for the minor coins, were we to look only for such as would exactly express what they are, would be Tenths, Hundredths, and Thousandths; but as these are words somewhat difficult of pronunciation, and very likely to be corrupted in common parlance, it may be advisable to select others. As to those suggested by the Committee, it has been objected that if we use the word Cent for a coin, there may be danger of confounding the English Cent, worth about $\frac{1}{4}$ d of our present money, with the American Cent, worth about a halfpenny. With still less reason the word Mil has been cavilled at as un-English. These defects appear more fanciful than real; but there is a substantial objection to the use of these words as names for coins which is strongly put by Professor De Morgan and others. They are, in themselves, excellent words, since they mark the relationship of the parts to the whole; but, if we apply them to coins, we must either use for money only words which would be applicable to all other things subjected to weight or measure, or, using them for both purposes, we should be under the constant necessity of explaining whether we meant a cent or a mil in money, or one of weight or measure. Now, as all who appreciate the merits and advantages of the Decimal System, look forward to its adoption for Weights and Measures as well as for money, it may be well to reserve the generic words for generic purposes, that is, to express the precise parts of all possible things, other than Money, which we can either weigh or measure, instead of, for the sake of a present convenience, applying them to a particular purpose only. As the tenth part of a Pound has already by general consent and adoption, an arbitrary name, and a foreign one to boot, why should we not give arbitrary English names to the two lower coins? A Farthing means a fourth thing; why, then, should we not call its proposed substitute a Tithing, which means a tenth thing,—and give the next coin above it some other significant or arbitrary name?

Supposing, however, the nomenclature suggested by the Committee to be adopted, we shall have for our Money of Account, (instead of Pounds, Shillings, Pence, and Farthings), Pounds, Florins, Cents, and Mills. Existing account books, with their present ruling, would then answer every purpose, without the expense of new books, or the labour of transferring accounts from one set of books to another. Here is a set of items in the old money contrasted with the same sums in the new:—

£ s. d.	£ fl. c. m.
37 14 11 $\frac{1}{2}$	37 7 4 8
21 16 6	21 8 2 5
18 19 7 $\frac{1}{2}$	18 9 8 1
6 12 3 $\frac{1}{2}$	6 6 1 3
7 7 10 $\frac{1}{2}$	7 3 9 3
5 0 5	5 0 2 0

It is true that the figures to the right, though sufficiently correct, are not exact Decimal expressions for the sums opposite to which they are placed. Thus the 11 $\frac{1}{2}$ d in the first item involves a repeating Decimal. We may write down .0489583333 and go on writing more threes to "the crack of doom," continually coming nearer to, though without the possibility of ever arriving at, the exact thing. This looks very formidable; and some of the opponents of the Florin, Cent, and Mil scheme have endeavoured to be tragically merry at the notion of *simplifying* Arithmetic by the introduction of such never-ending lines of figures! Such objectors either do not know, or, knowing, they ignore the facts that extended, or

repeating Decimals arise only from their connection with a non-Decimal Money, and that if our Money be decimalized, these terrible buggars will disappear. Some of the persons who have cavilled most pertinaciously against the purely Decimal scheme proposed by the Committee seem to take it for granted that, *after the change*, all questions of calculation will be proposed in the old money, which will have to be converted into the new, at the constant risk of encountering these abstruse and interminable Decimals. But let them dismiss their fears. The new money will displace the old; questions will be proposed and calculations made in it alone; and the non-Decimal penny will not remain as a coin of estimation after it has ceased to be a coin of either currency or account.

It is shown above how the new money may be entered in existing account books. It is probable, however,—nay,—it is certain that, before the system has been a month in operation, most persons, finding that there can never be more than one figure under any of the lower denominations, and that each denomination is sufficiently marked by its position, just as in common numbers, will no more think of writing Florins, Cents, and Mills over each, than they now do of writing units, tens, hundreds, thousands, &c. over each column in a sum of simple addition. It has been alleged that there must be four separate denominations, otherwise we shall be under the necessity of compressing two into one, and thus jumping from tenths to thousandths; but the probability is that, in practice, even if we have four denominations, we shall not only do this but also sink the tenths, using only two denominations,—Pounds and Mills. It is very likely, for example, that, in reading the first of the foregoing items, instead of saying "37 Pounds, 7 Florins, 4 Cents, and 8 Mills," we shall simply say "37 Pounds 748 Mills."

It fortunately happens that our present coinage affords us the means of adopting a perfectly Decimal System of account with a *minimum* of change, and that, too, without the absolute necessity of any new coin whatever, though those recommended by the Committee would be highly desirable. All our present coins, excepting guineas, half-guineas, and 7s. pieces in gold, and half-crowns, threepences, and fourpences in silver are perfectly adapted to the purpose. Thus, the Sixpence would be 25 Mills instead of 24 Farthings, the Shilling 50 Mills instead of 48 Farthings, the Florin 100 Mills, the Crown 250 Mills, the Half-sovereign 500 Mills, and the Sovereign 1000 Mills. The only necessary change is in the copper coinage. Even with this, all that is indispensable is to make the Farthing the thousandth part of the Pound, and the thing is done. This alteration would involve the loss, for once and away, to the holders, of 4 per cent. on all the copper coins in their possession. That is to say, at some certain period, to be fixed by Parliament, a man may go to bed with 2s. 1d. in copper in his pocket, and rise next morning worth only 2s. The loss would be, in fact, a Farthing, a Half-penny, or a Penny on every 25 of each of those coins,—Sixpence on every 12s. 6d. worth of copper, and a shilling on every 25s. worth. Taking the community generally, there would be very few indeed damaged to the extent of a single shilling. There are, however, numbers of tradesmen who take large sums in copper, and who get rid of it as soon as they can. Supposing any such person to have £10 worth of copper on the day in question, he would lose just 8s. by the change, a very small tax for a very great and immediate benefit, which would compensate him ten-fold, in a variety of ways, before six months were over his head.

But even this temporary loss, slight as it would be in most cases, quite inappreciable in many, and sure to be richly compensated in all, might be avoided. It is a mistake to suppose that copper coins have really the value at which they pass. There are in circulation a large number of the old, broad-rimmed penny pieces, of 16 to the lb. weighing each an ounce; those of more recent date are coined 24 to the lb.; both pass for the same amount, and yet there is a difference of just 50 per cent in their actual value. There have been, at various times, penny pieces coined at 17, 20, 26, and 29 to the lb. of copper; and many of these are still in circulation. There is the same variety nearly in half-pence and farthings. Copper coins have, in fact, only a conventional value, fixed by proclamation or Act of Parliament; and stamped bits of lead, tin, or even leather, would answer every home purpose quite as well, provided we could only be secured against the counterfeit. Let, then, a proclamation be issued, declaring the Farthing to be only the 1000th part of a Pound (calling it a Mil, or any other name); and directing that the light pence and half-pence shall pass for four and two Mills respectively, and the broad rimmed ounce Pence for five Mills, or half a Cent. Supposing this done, the proprietor of 2s. 1d. in copper, if he should chance to find only four broad-rims amongst it, as he very probably would, (for we seldom see sixpenny worth of copper without one), would then be exactly where he was, neither a gainer or a loser by the change, whilst he would be a Mil in pocket by every broad-rim above four. Sir J. Herschell, a most competent judge, is of opinion that the effect of such a measure would be an appreciation, not a depreciation, of the copper coinage, and that the holders would, on the whole, be gainers by about 2 per cent. Thus, without any new issue at all, or the withdrawal of a single coin, the present coinage might be rendered strictly conformable with the Decimal System, not only without loss but with actual profit to the holders. But as it is very desirable that the people should be brought to forget, as soon as possible, the old system of reckoning, and taught to calculate in tens only, and as old associations may be kept up indefinitely by retaining the old coins, it is advisable to withdraw them, and to issue a new copper coinage, consisting of 1, 2, and 5 Mil Pieces, as recommended by the Committee. These, with a 10 Mil piece in silver, would be amply sufficient for all small transactions, and would even diminish the inconvenience of giving or taking change in copper. For instance, 5 Mills could always be paid by giving a sixpence and receiving two 10 Mil pieces. Supposing the old copper coins retained at altered values, a Mil would be paid by giving a large Penny for a small one. The whole secret of the alteration, which has been derided as a hopeless mystification for the poor, is, in fact just this,—the Sixpence will be a Farthing more than it used to be, the Shilling a halfpenny, and the Florin a penny; the Cent will be five to the Shilling; and Shillings and Pounds will remain as they are.

The retention of the Penny, or any coin exactly equivalent to it, would however, cause much confusion, and might postpone indefinitely the complete adoption of a better system. Supposing, then, the old copper coinage called in, and a new one issued, present holders might be equally secured against loss by giving them in exchange 5 Mills for the old Penny pieces, four for the smaller ones, two for a Half-Penny, and one for a Farthing. As to the Threepenny and Fourpenny bits, which must be withdrawn, a compromise might be effected without serious loss to any party, simply by Government giving 14 Mills for a Threepenny bit,

and 18 for a fourpenny one, a loss of about 1 per cent only; or, as there have been large profits on the coinage of both silver and copper, Government might very gracefully remove even this slight objection by giving 15 and 20 Mills for these coins. That there have been great profits is certain, for though there are penny pieces of 16 and 24 to the lb., the value of the lb. of copper, uncoined was only 1s. 0½d., leaving a margin, for cost of manufacture and profit, of 3½d. in the one instance, and of no less than 1¼d. in the other; whilst silver, the market value of which is only 6s. 1d. per oz., circulates as coin at 5s. 6d. Those persons who lay great stress on a slight depreciation of the copper coinage seem to forget that copper and silver coins are, *with us*, only tokens whose intrinsic value has been altered repeatedly. There was, formerly, a difference between English and Irish currency, the English Shilling being 13 Pence Irish, the Irish Shilling 10d. English, and the Pound Sterling £1 1s. 8d. Irish. In this state the Irish currency remained from the time of James II, who depreciated it, down to the end of the first quarter of the present century. In order to do away with the inconvenience resulting from this difference the 6th of Geo. IV. c. 27 enacted that British coins of Gold and Silver should be current in Ireland at British rates only; that the Irish Shilling should be withdrawn; that the English Shilling should pass only for 12d. British instead of 13d. Irish; and that the Irish copper should be called in and exchanged at the rate of 13d. British for 13d. Irish. On the 20th of December, 1825, a proclamation to this effect was issued. Some outcry was raised against it, on the supposition that the holders of Irish copper lost a penny in the shilling; but the loss was soon found to be imaginary only. Owing to some unexplained cause, the Irish copper was never actually called in. It still exists, and it circulates, to this day, as freely in England as it ever did in Ireland. Nobody thinks of objecting to it; and this fact alone, if others were wanting, would be sufficient to show how purely conventional is the value of our present copper money. The change in Ireland, though there seemed to be formidable obstacles in the way of it, was effected without any serious difficulty, or inconvenience; and the holders of copper, instead of losing a penny in the shilling, as they feared, were really gainers by about 8 per cent. The object in view, that of assimilating the currency of the two countries, was, undoubtedly, beneficial to both; but the advantage was as nothing compared with that which would accrue from another alteration in copper money, for the purpose of introducing a perfectly Decimal System of currency and account.

There is no record another striking instance of what can be done with Money by proclamation. At the time of the Restoration there were in this country no fewer than fifty one gold coins, thirty seven of them differing in value, and most of them including shillings and pence,—all of which were raised by proclamation, at the rate of rather more than 6½ per cent. These coins ranged from the old Rose Noble, worth £1 16 s. 4 (which was raised to £1 18 s.) to the Quarter Angel of 2s. 9d. (raised to 2s. 11d.). One more example may be mentioned. In America, formerly, the Dollar passed in one State for 4s. 8d., in another for 6s., in a third for 7s. 6d., and in a fourth for 8s. In 1792 a law was passed by Congress making the Dollar uniform in all the States; and the change was effected without difficulty and gave universal satisfaction. In our own country what has been fixed by act of Parliament and proclamation can be altered by act of Parliament and proclamation; and all that is substantially necessary to effect the Decimalization of our coinage is to declare the Farthing the thousandth part of a Pound.

PARTLY DECIMAL AND NON-DECIMAL SCHEMES.

In any alteration there are to be kept in view two mainly essential points, neither of which can be compromised without such disadvantages as would render inexpedient any change at all. The first is that an entirely Decimal or ALL-TEN Money of account should be introduced, with such alterations in the Money of exchange as may be best adapted to it; the second that the Pound sterling, at exactly its present value, should continue to be the unit or integer. Both of these points will be attained under the plan recommended by the Committee of the House of Commons, and by none other so perfectly.

With respect to the first point, it would be most absurd to incur the trouble and inconvenience of a change for any less advantage than a purely Decimal System of computation; yet various other schemes have been suggested, and nearly all of them by persons who suppose themselves to be advocates of the Decimal System, every one of which schemes, (excepting that which would make the Pound of account 10s. only and give as the smallest coin the 2000th part of our present Pound) departs more or less from a strictly Decimal System, the smallest deviation from which would diminish the advantages anticipated. All of them would necessitate a complete change of all our present gold and silver coins, and would unhome every contract throughout the empire, as well as salaries, rates, tolls, and taxes. All these are really regulated in Pounds, and Shillings,—for if Pence or Farthings be named, it is only as parts of the Shilling, and their place can be much better supplied by a Decimal division of the existing Pound into tenth, hundredth, and thousandth parts. No one, having the general advantage in view and not the success of some particular crotchet of his own, can hesitate to decide in favour of that plan which has the great merits of simplicity, completeness, and comparative inexpensiveness to recommend it.

With regard to the second point, the retention of the Pound sterling, practical men are all but unanimous in the opinion that any alteration in its value, or the substitution of any other unit of account, would occasion most grievous commercial inconvenience, since either proceeding would disarrange all pecuniary transactions, both at home and abroad. All our national obligations, our whole financial history, our mercantile intercourse with foreign nations,—in short all our associations of value are based upon the Pound sterling. If we alter its value, as we must do if we start from the existing Farthing or the Penny as the foundation of a Decimal System of account, we shall fail to accomplish what is desired; if, on the other hand, we make a Pound, or whatever else it may be called, of ten shillings, subdivided into tenths, hundredths and thousandths, the highest money of account, we shall have constantly to convert them into Pounds sterling, to the needless multiplication of figures. This latter proposal is founded on the supposition that a smaller coin than the Farthing, or the Mil, is required. That there is no such necessity is proved by the facts that, upwards of twenty years ago, Half-Farthings, to a very considerable amount, were coined, and that they remain at the Mint or the Bank to this day, never having been applied for by those whose imaginary convenience they were intended to meet. If the public do not want the 1020th part of a Pound, as they clearly do not, it may very safely be assumed that they have no occasion for the 2000th part of it, with which the advocates of a 10s. unit are desirous of supplying them. The fact is that even the farthing is used or received as a coin by scarcely any shopkeepers but retail grocers. It is not known in the draper's trade. The customer or the shopkeeper loses the odd farthing,—generally

the customer. Rather than make any change incompatible with a completely Decimal System, and the retention of the Pound sterling at its present value, it would be much better to remain as we are, for we should otherwise only involve ourselves in new elements of trouble and perplexity, without any compensating advantages. With our present clogs we are at least familiar; let us not heedlessly substitute others for them.

Of the schemes started in opposition to that of the Committee, one, the 10s. unit, has already been mentioned. Here are others:—

No. 1. 10 Farthings=1 Penny; 10 Pence=1 Franc; 10 Francs=1 Ducat or Victoria.

No. 2. 4 Farthings=1 Penny; 10 Pence=1 Franc; 24 Francs=1 Pound.

No. 3. 4 Farthings=1 Penny; 10 Pence=1 Albion; 10 Albions=1 Imperial (8s. 4d.).

No. 4. 10 Mills (Farthings)=1 cent (2½d.); 10 Cents=1 Dime (2s. 1d.); 10 Dimes=1 Prime (£ 1 0 10).

No. 5. 10 Mills (Farthings)=1 Cent; 10 Cents=1 Florin; 10 Florins=1 Victoria (£1 0 10).

No. 6. 5 Cash (Farthings)=1 Penny; 10 Pence=1 Shilling (1s 0½); 2 Shillings=1 Cent (2s. 1d.) 10 Cents=1 Mil (£1 0 10).

No. 7. 4 Mills=1 Cent (¼d.); 10 Cents=1 Decim; 10 Decims=1 Imperial (8s.).

No. 8. 2 Centimes=1 Farthing; 10 Farthings=1 Lion; 10 Lions=1 Florin; 10 Florins=1 Queen (£1 0 10).

All these eight plans are based on the unaltered Farthing and Penny; all would displace every other coin, altering, as they do, the value of the Shilling and the Pound 4½ per cent; and none are strictly Decimal, excepting No. 1, which stops at 8s. 4d., because another Decimal step upwards would bring it to £4 3s. 4d., rather too much for a current coin. The sum proposed for the highest coin under this plan is too great for a silver coin, and too small for a gold one. The Half-Sovereign costs as much in manufacture as the Sovereign; and the wear and tear (consequently the loss) is much greater. Where, then, would be the policy of making a coin one-sixth less than the Half-Sovereign, the principal coin of account and currency? The author of No. 3 would go a step beyond this, for he proposes that Pounds, Tenpences, and Pence, or, at option, merely *Tenpences* and Pence shall be the legal coins of account. Fancy the revenue accounts, or the National Debt stated in this way! A man may have some vague notion of what £800,000,000 means, though it would occupy him upwards of eighteen years, counting 200 Sovereigns a minute, for ten hours every day, Sundays included, to reckon the whole amount; but what possible idea could he form of 19,200,000,000 Tenpences, or, still worse, 192,000,000,000 Pence? To expect people to substitute either Pence or Tenpences for the Pound is surely about as reasonable as it would be to ask them to adopt the Spartan monetary system, under Lycurgus, when it required a cart and yoke of oxen to move a matter of £20. If the Pound be retained (as it must be) every one of these schemes would be flanked with non-Decimal Fractions either on the side of the Penny or the Pound, and that, of itself, is a sufficient objection to them all.

The three first of the plans specified above, and all others which include a coin of the value of 10d. are recommended by their advocates as being nearly identical, with respect to that coin, with the French Franc, and exactly a fourth part of the American Dollar, and therefore as being

highly advantageous for the comparison of English with French and American money. It so happens, however, that the Franc is worth only $9\frac{1}{2}$ $\frac{1}{10000}$ d. of our money. This seems very near, but, in money matters, it would never do to rely on approximation. We must have exactitude in money. The value of 3000 English Francs, or Albions, would be £125; that of 3000 French Francs £118 18s. 10 $\frac{1}{2}$ d.—a difference of exactly £4 16s. 10 $\frac{1}{2}$ d. per cent. The approximation of the Albion and the Franc would therefore be of no use whatever. It may be said, indeed, that very little more silver in the Franc would bring it up to our Albion, and then we should have pleasant counting with both France and America. But assimilation would be no better than approximation. The Swiss Franc is of exactly the same form and value as the French one, the only difference between them being that one bears the French the other the Helvetic insignia; but the Swiss Franc does not pass in France, nor the French Franc in Switzerland. A congress of nations has been spoken of, to devise a universal coinage, a thing more hopeless than a universal language, for the latter is not absolutely impossible, whilst the former is a mere chimera. The experiment has been made, on a small scale, with ingots, discs, and horse-shoes of Gold in England, America, and China, and the intended universal representatives of money did not pass into circulation even in their respective homes. Supposing that each country had, in addition to its own local money, one which would pass everywhere, the very circumstance of its convenience would raise the latter to a premium; and supposing there were no local money at all,—nothing but one universal money, current all over the world, we should still be not a whit nearer to the *desideratum*. The Monetary Universalists ignore the well known fact that the value of the precious metals, like that of all other commodities, varies according to the supply and demand; and, as between commercial countries having dealings with each other, is constantly changing according to the balance of trade. Here in England the law enacts that the Sovereign, of a certain weight and fineness shall have one fixed, unvarying value. This is a mere fiction, for the sovereign will sometimes purchase more, sometimes less, and therefore it *does* vary in value; but no law can keep Sovereigns at home when they are worth more, or have a greater purchasing power (which is the same thing) abroad. A rate of exchange under 6 per cent. in favour of England sends gold to the United States, and one of 10 and a fraction per cent. brings it back again. The balance of trade may, any day, render it advantageous to ship dollars from Mexico or Brazil to England; and on their arrival, a change having taken place in the interim, it may be found profitable to transmit them to some place on the continent, or advisable to send them home again to avoid serious loss. Thus, if we had, tomorrow, a coin, say an Albion, of exactly the same value everywhere, it is quite certain that, by this day next week, that value might differ in almost every country with which we trade, being, perhaps 10d. in London, 9 $\frac{1}{2}$ d. at Paris, 8 $\frac{3}{4}$ d. at Hamburg, and 11d. at New York. To effect this universality even for a day, we must either make our silver coins of full value (thus adopting a silver standard),—or we must pay in gold. At present the lb. of silver is coined into 66 shillings. It is most evident that whilst this quantity of silver can be got for £3 1s. 0d. (at 5s. 1d. per oz.) we shall not send away silver tokens which pass for £3 6s. 0d.; and it is equally certain that other countries will not take them at £3 6s. when their intrinsic value, new and of full weight, is only £3 1s. There is reason to believe, moreover, that both France and America contemplate the substitution of a gold standard for

one of gold and silver. If this be done, we, having changed our gold standard for one of silver, and altered all our coinage, save that of copper, to accommodate it to those of other countries, may find our new standard abandoned by those very countries, and be compelled to return to our discarded Pound.

Better remain as we are than make a non-Decimal change with any such visionary expectations as these. Nations might have a common standard of Weights and Measures,—for there is nothing to prevent it but a want of mutual accord; they might also have a common language though they have not had it since Babel, and are not likely to have it before the Millennium; but a common and unvarying Money is, and, so long as nations trade with each other, must remain a sheer impossibility. Those who advocate it seek what is perfectly unattainable; and in so doing, by diverting public attention from what is practicable, they obstruct, so far as their influence goes, the accomplishment of a safe, easy, and most salutary reform.

THE REAL DECIMAL MOVEMENT.

Two Royal Commissions and a Select Committee of the House of Commons, having reported, unanimously, in favour of the Decimalization of Money, Weights and Measures, and the Committee having pointed out, clearly and specifically how this might be accomplished as to the Coinage, it might have been only reasonable to suppose that Her Majesty's Ministers would suffer no party motives, or any mere considerations of official ease and convenience, to stand in the way of so great a public benefit. But, unfortunately, this is not the way in which an English Government understands its functions. The session of 1853 passed away with nothing done; and that of 1854 promising to be equally barren of results, private individuals, as usual, found it necessary to neglect their own business in order to induce Ministers, by the pressure of public opinion, to attend to theirs. The following requisition was accordingly prepared and submitted for signature.—

"We, the undersigned, believing that the adoption of a Decimal System of Money and Accounts would be of National Advantage, are of opinion that an Association should be formed for the purpose of spreading information upon the subject, with a view of obtaining the early adoption of the Measure recommended by the Decimal Coinage Committee of last session."

This requisition was signed by the Duke of Leinster; the Marquises of Westminster and Westmeath; the Earls of Burlington and Donoughmore; the Bishops of Chester and Manchester; Barons Mostyn and Montague; 256 members of the House of Commons; 54 Mayors and Provosts (including the Lord Mayors of London and York, and the Lord Provosts of Edinburgh and Glasgow); 8 Chambers of Commerce, and 4 Societies for the protection of Trade (including those of Liverpool); 14 Scientific and Literary Institutions; and many of the most eminent merchants, bankers, &c., of London and the provinces. The result of this requisition was a public meeting, held at the London Tavern, on Monday, June 12, 1854, at which the DECIMAL ASSOCIATION was established. The meeting was addressed by Wm. Brown, Esq., M.P., who occupied the chair, Kirkman Hodgson, Esq., J. Ingram Travers, Esq., Jas. Heywood, Esq., M.P., Wm. John Hall, Esq., Jno. Greene, Esq., M.P., and R. R. Moore, Esq. The resolutions, three in number, were carried unanimously. The first declared the objects of the Association to be "to spread information, collect subscriptions, and obtain the

immediate issue of the requisite Decimal coins, and the early adoption of a uniform system of Decimal Weights and Measures." The second resolution declared the expedience of retaining the Pound sterling as the unit of account, and that the only new coins requisite to complete the Decimal scale were the Cent and the Mil. And the third appointed a deputation to the Chancellor of the Exchequer to urge "the coining of a sufficient number of Cents and Mills, to circulate, for the present, along with the existing copper coins, which may be gradually withdrawn from circulation."

A report of the proceedings and resolutions of the meeting was forwarded, next day to the Right Hon. W. E. Gladstone, then Chancellor of the Exchequer; and, on Tuesday, June 20, the deputation, headed by Mr. Brown, waited upon him, by appointment, at his official residence. Having listened very courteously to Mr. Brown and other members of the Deputation, the Right Hon. Gentleman met the proposition that Government should take the lead in so salutary a reform, and the intimation that all it need do at present was to issue the necessary coins, with the customary official objections, and with some inconsistencies of his own. He admitted that the reform was most desirable but said that, inasmuch as there was no pressing popular demand for it, on the one hand, and much ignorance and prejudice arrayed against it, on the other, Government did not consider it advisable to take any step whatever in the matter. "Although," said he, "it is true that we have had Royal Commissions, and Select Committees of the House of Commons, to inquire into this subject, it has not, as I think, yet gone through any thing like that process of sifting in public opinion that would make it safe for the Government to take any decided steps in regard to it."

Rickety indeed must have been the condition of a Government which considered it unsafe to take part in a reform which its organ described as most desirable, especially when all it was asked to do for the present, was to issue the two minor coins in the Decimal Scale, with their value in the smallest denomination distinctly marked upon them. No wonder that such a Government fell to pieces within six months afterwards. Yet, timorous as Mr. Gladstone was as to the modest step which he was asked to take, this was his opinion of the measure which he declined to forward: "I cannot doubt," he said, "that a Decimal system of coinage would be of immense advantage in monetary transactions. The weight of authority on that head is altogether irresistible; but I do not think, when we come to the adoption of a system, that we have obtained sufficient evidence of the sense and feeling of the country with respect to it. It is true that those people who have studied and paid attention to the question of a Decimal Coinage are unanimous in recommending it, on account of the many advantages which it possesses over all other systems. Now the people who have so studied the question are gentlemen who have been more or less actively engaged in commercial pursuits" ("—therefore the very persons on whose opinion, in such a matter, an enlightened Government should act," "but the public at large does not seem to be acquainted with it.")

Why should Mr. Gladstone assume that the people are so completely ignorant? On what grounds should he form so low an opinion of their intelligence? Only because "the public at large" have not asked for this particular reform in the same significant manner in which they have demanded others. There had been few or no public meetings,—not many petitions,—no riots, no threats of refusing taxes,—no call for a swamping of the Peers:—in the absence of these things Mr. Gladstone

assumed that the people took no interest in the matter at issue, and therefore that their rulers might safely slumber on. But surely this was to under-rate the functions of Government, and convert it into a mere machine for effecting such measures only as the public demand with an energy and perseverance destructive of official quietude, if not dangerous to the peace of the state.

But Mr. Gladstone was unphilosophical and inconsistent, as well as unstatesmanlike. "It is, as you are aware," he said, "the enormous masses of the community who have immense business to transact, that must guide the Government in this matter. They are attached to the present arrangement of the currency." Accustomed to, he should have said—not "attached." People become accustomed to labour, may even to dance, in fetters; but they are seldom, if ever, *attached* to such inhumanities,—and never so foolish as to imagine that fetters facilitate motion of any kind. Such is the attachment felt for "the present arrangement of the currency" by all who have bestowed the smallest attention on the subject. For the attachment supposed, Mr. Gladstone assigned this most singular reason:—"It admits," said he, "of different divisors, and is the basis of all their notions of value. It has also many facilities of division which you must lose if you abandon it. It is impossible for you not to be struck with this,—an advantage which takes its origin from the number of factors which a combination of the Decimal with the Duodecimal gives rise to. With the Government it is impossible not to be so struck." If the Government were "so struck" then were they struck most comically,—for the "different systems of divisors," the "facilities of division,"—the "number of factors," and the "combination of the Decimal with the Duodecimal" are the very things which corrupt and perplex Arithmetic,—the very evils against which the Right Hon. gentleman had declared "the weight of authority" to be "altogether irresistible!" It is difficult to conceive how a man of such logical acumen as Mr. Gladstone could blow so very hot and so very cold in the same breath, first as to the confessed superiority of the Decimal to all other systems, —and then as to the supposed advantage of combining those inferior systems with the best. It is just as if a man were to say of a race-horse "Eclipse beats all competitors; but it would be a great advantage if we could combine all their separate faults with his excellencies, for then we should have a horse on which immense masses of the sporting community might lay out their money to advantage." There is not a gentleman on the turf,—not a stable boy, that would not laugh at such absurdity, spoken of a horse; yet, *mutatis mutandis*, it is exactly what Mr. Gladstone said of the Decimal System as compared with all other systems. His inconsistency can only be accounted for on the supposition that he has given very little attention to the subject, and requires himself a little of that education respecting it which he prescribed for the people.

Take another of his objections. Again referring to the present cumbersome and defective system,—our Dobbin versus Eclipse, he said, "it is so wound up in the habits of the people that it would not be advisable to have recourse to any change unless we had clear evidence that it was one the people themselves required and understood. * * * I would only ask you are the people prepared for the change? All I can say is that we cannot take any decided steps until we are satisfied that the subject has been thoroughly sifted, and is well understood by the people." In all this Mr. Gladstone, like many others of lower note, did not sufficiently appreciate the aptitude of the industrial classes to understand, and to accept cheerfully and thankfully what is for their own benefit. Their intelli-

gence is under-rated, and sufficient credit is not given to them for plain common sense. It is an insult to suppose them incapable of understanding, without a long course of preparation, that a Sixpence will be 25 Mills instead of 24 Farthings, and that 40 of these Sixpences of 25 Mills will make a Pound, just as 40 Sixpences of 24 Farthings do at present. Why should they be supposed incapable of comprehending that, by this slight alteration in the value of the Farthing, and by the issue of another coin, ten times its amount, in addition to the Florin, we should so simplify monetary calculations that we shall bring them all within the four first rules of Arithmetic, thus abolishing, as regards Money, many other rules—and that, by extending the same *all-ten* system to Weights and Measures, we shall get rid of many of those rules altogether?

This is a plain statement of the whole question at issue, level to the most ordinary comprehension: yet we are told of obstacles requiring much time and labour for their removal,—obstacles which have no other foundation than the supposed inability of the public to understand such self-evident propositions. We know that, in this country and in Ireland, much greater changes in the currency have been effected, over and over again, without difficulty, and for objects much less important. We know that a Decimal System, more or less perfect has been adopted in France, Spain, Portugal, North and South America, Sweden, Holland, Belgium, Russia, Poland, Rome, and several other Italian States, and that it has been in operation, time out of mind, in China and Japan. We know that wherever it has been substituted for an inferior system the change has, generally, been effected by the Government, in advance, or in the absence, of any popular demand, and has always been received with satisfaction and approval by the people,—nay that, in Madeira, the people, without any interference on the part of their Government, by combining foreign coins with their own, constructed a Decimal money for themselves. Strange that we, imagining ourselves to be the most commercial people in the world, should be amongst the last to appreciate the advantages of such a system, and should even yet be disputing whether an easy and simple system of Arithmetical computation is, or is not, well worth the trifling inconveniences that might be incurred in obtaining it!

Mr. Gladstone seemed positively to anticipate active resistance, and public disturbances, if Government conceded the good thing it is ready to grant when duly pressed, without much preparatory training of the people. He might have taken comfort and courage from the behaviour of the people of France under precisely such an infliction, knowing that Englishmen are not so very much behind Frenchmen, in a matter of plain common sense, at all events, as to render it probable that they would behave less rationally under similar circumstances. "The introduction of the Decimal System in France," said Dr. Bowring, during the debate of 1847, "with whatever resistance it had been originally met, was now a matter of universal congratulation. No man could be found in that country who did not acknowledge its benefits. It had supplanted a currency of pounds, shillings, pence, and farthings (the *livre*, *sol*, *denier*, and *liard*). These had been replaced with Francs and Centimes; and though, sometimes, the old names were heard they introduced no confusion, and the National Assembly, by the Establishment of the Decimal Coinage, was everywhere recognized as having conferred an immense benefit on the country." Now, the Decimal System recommended by our Parliamentary Committee, and advocated by the Decimal Association, would be found much superior to the French System, which errs in having too small a unit. It would confer greater advantages and would therefore be still

more justly a subject for national congratulation here than a less perfect measure was in France; but Mr. Gladstone thought it too good a thing to be given voluntarily by the Government, and would have the people educated for it, as usual, by private individuals, on whom our rulers are but too apt, in all such questions, to devolve their own duties. "I hope," said he, "that those who are engaged in this movement will persevere in their labour until they bring it fully and fairly into the view of the public, when discussion will, I hope bring it to some practical result. As it is, I feel that we are not ripe for a decisive measure upon the subject; and I think that the aid of Parliament should not be invoked until we are ready for the change."

DEBATE IN THE HOUSE OF COMMONS.

The result of the Deputation to Mr. Gladstone in 1854 has been described. Fortunately for the ultimate success of the cause to which he, on the part of the then Government, refused a helping hand, "those engaged in the movement" took his advice, and did persevere in their endeavours to enlighten public opinion upon it. The Decimal Association continued its labours; and, on the 12th of June, 1855, twelve months after the delivery of Mr. Gladstone's exhortation, it invoked, through its chairman, the aid of Parliament to press upon another Chancellor of the Exchequer, and another Government the change of which their predecessors admitted the advantages, but in which they did not venture to take the initiative. On that day Mr. Wm. Brown brought the whole question under the consideration of the House of Commons, and concluded an able and argumentative speech by submitting the following resolutions:—

1. "That in the opinion of this House the initiation of the Decimal System of coinage, by the issue of the Florin, has been eminently successful and satisfactory."
2. "That a further extension of such system will be of great public advantage."
3. "That a humble address be presented to Her Majesty praying that she will be graciously pleased to complete the Decimal Scale with the Pound and the Florin, as suggested by two Commissions and a Committee of the House of Commons, by authorizing the issue of silver coins to represent the value of the one hundredth part of a Pound, and copper coins to represent the one thousandth part of a Pound, to be called Cents and Mills respectively, or to bear such other names as to Her Majesty may seem advisable."

The motion was seconded by LORD STANLEY who, in a very masterly manner, contrasted the defects and inconveniences of all other schemes, especially the Tenny penny one, with the simplicity and efficiency of that proposed by the Committee, and contended that "the objections urged against the latter were either illusory or unimportant. The next speaker, Mr. J. B. SMITH, admitted that the advantages of a Decimal System had not been at all over-rated; but he thought it a remarkable circumstance that all the witnesses examined by the Committee were in favour of the Pound Sterling as the unit; suggested the necessity of further inquiry; was of opinion that Weights and Measures should be Decimalized as well as Money; and moved, as an amendment, an address requesting Her Majesty to invite a congress of nations to consider the practicability of a common standard of Money, Weights, and Measures. This proposition had no second; but the next speaker, Mr. LOWE, after admitting, generally, the advantages of the Decimal System, and stating that the only difference was as to the *modus decimandi*, proceeded

to ridicule that very system which he affected to approve. He indulged in sundry witticisms against the plan proposed by the Committee, and this without submitting any scheme of his own, or venturing an opinion on those of others, beyond a suggestion with regard to the comparison of English and French money, amounting to this,—that if we had a coin of 10d., “then, by adding a per-centage for the exchange we might easily calculate the difference.” His objection to the Pound unit was that it was too large, and that it necessitated division instead of addition, as in other countries, to arrive at the value of the smaller coins. What merit of any kind, he asked, had the Florin, *except* that it was the Decimal of a Pound? They did not calculate in Florins; and as to the alleged convenience of those coins, the only experience he had of it was that when he ought to have received Half-a-crown he had generally received a Florin, and when he ought to have paid a Florin he had generally paid Half-a-crown! Then they came to 2½ of a Penny, but who ever reckoned, or wished to reckon in such a coin as that? As to the Mil it was either too small or too large! If the proposed system were adopted they would be compelled to live in Decimals for ever. If a man dined at a public-house, he would have to pay for his dinner in Decimal fractions, which was most objectionable, for a man ought to be able to pay for his dinner in integers! Every sum would have to be reduced into the vulgar fraction of a Pound, and then divided by the Decimal of a Pound—a pleasant task for an old apple-woman! The Decimal expression for a Farthing was, .00104166 *ad infinitum*. And this was the system which was to cause such a saving in figures!

These jokes and others like them excited much merriment. It is only charitable to suppose that the House laughed at and not with the utterer; and yet the bald witticisms of the honourable member were scarcely more ridiculous than the pedantic platitudes of Sir G. C. Lewis, the gentleman who has succeeded Mr Gladstone as Chancellor of the Exchequer, and who adopted several of the Kidderminster pleasantries. After gravely re-informing the House, in detail, that the plan before it was identical with that recommended by the Royal Commissions, and ratified by its own Select Committee, and after pledging his own individual belief in the sincerity of the mover, the Right Hon. gentleman announced that the first circumstance which struck him, in examining the motion, was that it assumed that the Pound was to be maintained as the standard of currency; that next to be taken was the Florin; and that two new coins, the Cent and the Mil were to be issued to complete the scale. If the House adopted the motion, it would declare in favour of that system! But there were various other plans (which he described *seriatim*), and one of them, which ascended from the Penny instead of descending from the Pound, was supported by strong arguments. Sir George did not enter further into the merits or demerits of the competing plans; but his own objections to that before the House (in addition to the difference of opinion as to the unit) were briefly these:—1. We do not reckon by, or sell with, the Florin. 2. The Cent of 2½d. would, unless mixed with some alloy, be too small for silver, too bulky for copper, and any attempt to establish it would prove a signal failure. (Perhaps Sir George has never seen or heard of the Threepenny piece.) 3. The Farthing is a coin used, to a certain extent, amongst the labouring classes, but a very large portion of the community are practically unacquainted with it; and if a still smaller coin were substituted for it great inconvenience would arise from the abolition of all computations now made by the use of the Penny. 4. Neither of the

two new coins is a multiple of the existing coinage, and in reducing them to the existing denominations it would be necessary to resort to a long series of decimals. 5. Buyers and sellers might soon come to an arrangement; but the trouble of adjusting prices fixed by Act of Parliament such as tolls and payments in any denomination less than a Florin would be endless, and such as would exhaust the patience of any legislative assembly, whilst if it were thrown upon the Government no Government could perform so inconvenient a duty without exciting general dissatisfaction. 6. Only 133 petitions had been presented, and surely that number could not be considered as indicating any widespread feeling upon the subject. 7. The proper mode of proceeding was by bill, not by address, as the new coins could not supersede the present money of account, unless by Act of Parliament. 8. The motion if carried would be inoperative. On grounds such as these, though freely admitting, as he declared “all that had been said as to the practical advantages of having a Decimal computation of our coinage,” and professing that he “should rejoice” in its realization, the Right Hon. Gentleman urged the withdrawal of the motion, under the assurance that, if it were withdrawn, the subject “should receive the most careful consideration possible.”

This advice was backed by Mr. CARDWELL, who said the House had before it cumulative authority of the highest kind in favour of a Decimal plan which might be adapted to our Currency with the least practical inconvenience at home, and the least disarrangement of the exchanges abroad; that his Hon friend (Mr. Brown), who had rendered great service to the public, had every reason to be satisfied with the progress the question had made; but that if the motion were now pressed to a division it would lose the support of many persons who, like himself, cordially concurred in desiring the ultimate attainment of the object in view, but who thought the question, as yet, was hardly ripe for legislation. The withdrawal of the motion was also urged by LORD PALMERSTON, who observed that, for his own part, if he were called upon to carry the Decimal System into effect, he could not say he should differ from the opinion that the Pound should be taken as the starting point, and the coinage decimalized in the lower denominations. But there were many who, thinking a Decimal coinage desirable, would begin at the other end, and take for the unit the lowest denomination of coin. Now, if the motion were agreed to it would not only pledge the House to one particular system, but would lead the country to suppose that the thing was so far matured,—that the change would be effected at an early period. Considering the vast importance of the alteration, and the inexpediency of making it without much more investigation, he thought his Hon. friend should content himself with the discussion, and not ask the House to come to any decision. If the motion were persisted in he (Lord Palmerston) should certainly vote against it, because, if the proposal were not to be carried into effect, groundless apprehensions would be excited,—whilst if it were, it would, at present, cause great confusion, and be attended with incalculable evils (?) to large classes of the poor. It was evident, too, that no change could be effected by a mere exercise of the prerogative, so that unless the Honourable member was prepared to bring a bill on the subject, the resolutions, even if carried, would be a dead letter.

On a division the first resolution was carried by 135 to 56, being a majority of 79 against ministers, and against many who, like Mr. Cardwell approved of it. The second resolution was agreed to without a division; and the third was withdrawn.

WHY THE PEOPLE SHOULD AGITATE.

The result of the unequivocal manifestation of the opinion of the House of Commons above recorded has been the appointment, by Government, of another Commission, consisting of Lord Montague, Lord Overstone, and Mr. Hubbard, to reconsider the whole question. It is not to be doubted that these gentlemen will discharge their duty ably and conscientiously, or that, in due time, they will issue a report confirming the decisions of the two previous Commissions and the Committee of the House of Commons. But it is to be apprehended that their appointment is only the usual expedient of all Governments for staving off a decision; and that, unless there be some active pressure from without, there may be half a dozen other Commissions and Committees before this important question is finally settled. Her Majesty's present Ministers like their predecessors, are evidently convinced of the great utility of the change proposed, and, like them, they are willing to postpone enlightened legislation in deference to popular ignorance and prejudice, thus abrogating the proper functions of Government and Legislation, and waiting to be coerced by the popular voice into what is wise and good,—ever driven, never leading. It was only by dint of ridicule that a former Government was, not so very long ago, beaten out of the time honoured absurdity of keeping the Exchequer accounts in notched sticks; and the present Government would seem to require something like compulsion to induce it to effect another reform, not less rational, and still more important. If ever there were a question on which Government should take the lead, it is this of Decimal Reform, which can hardly ever be the subject of a popular demand, but in favour of which a leading member of the late Government declared the weight of authority to be altogether irresistible. To confer a great practical boon on the people, the benefits of which would soon be universally acknowledged, Government might safely have resorted to a little enlightened despotism, for once and away,—even if the public generally had been hostile to any change instead of simply apathetic, in the certainty that a very short period would elapse before all men would admit and proclaim that, in departing temporarily from strict constitutional principles, Ministers had conferred a great and lasting benefit upon the country. Not so thought the late Government; not so thinks the present, which is avowedly waiting to be guided, or goaded, by public opinion, into the course of duty. This being the present position of the question, the FINANCIAL REFORM ASSOCIATION will state, in addition to what has been already urged, some reasons why the people should agitate that question, make it their own, and take especial care that when a bill to effect this great reform is presented to parliament next session, Sir George Cornwall Lewis, if he should then be in office, shall no longer have it in his power to say "Only 133 petitions have been presented:—call you that a manifestation of public opinion?"

It has been the fashion, in some quarters, to represent this question as important, perhaps, to merchants and others having much to do with accounts, but as one in which the people generally,—most especially the working classes and the poor, have no interest, or none to compensate them for the trouble, annoyance, and temporary loss which must accompany the change. Now, sup-

posing that merchants and manufacturers advocated that change solely because it will enable them to economize time and labour, and to conduct their business with fewer clerks and assistants, everybody knows that the expenses of the merchant's establishment must be paid out of his charges, and that the labour employed on the production or manufacture of the goods in which he deals is not more certainly an ingredient in their cost, to the consumer, than is the labour employed in the buying and selling of those goods. All must come out of the pocket of the consumer, or the merchant will soon find his way into the Gazette. It is evident, therefore, that whatever tends to reduce the cost must be directly beneficial to the consumer, whilst the merchant, though he may wish for a better system of conducting his business, so far as accounts are concerned, has, in reality, no special pecuniary interest in the matter, because the extra-expenses of the bad system are, in point of fact, borne by his customers, whom some persons fancy to have no interest in the introduction of a better and a cheaper one.

It is the consumer, that is the people generally, who will, ultimately, derive the benefit of the improved mode of conducting the merchant's business, and the economy of skilled labour which must result from the adoption of a Decimal System of account and currency; and it is in the interest of the people that the FINANCIAL REFORM ASSOCIATION, looking to a similar improvement in all the Government departments, have taken up the question. But, quite independently of the pecuniary advantage to be derived from the cheapening of commodities, it is demonstrable that this question is, before all and above all, that of the working man. The property of the working man consists in his time and his labour. The Decimal System will economise both, or, what is the same thing, will enable him to turn them to greater advantage. Working men, generally, are aware of the great utility of education. Whether they have themselves enjoyed that blessing or not, they are, for the most part, laudably anxious to secure it for their children. They send their children to school, but can seldom allow them to remain there long, and generally remove them the moment they are old enough and strong enough to help the family with their work. Now, whether the school-time be long or short, a very considerable portion of it is devoted to Arithmetic, the study of which will be so greatly simplified by the adoption of the Decimal System that nearly four-fifths of that time will be saved, and may be devoted to other branches of knowledge. By the Decimalization of Money Weights and Measures, children will learn arithmetic speedily and effectively at school, and, throughout their lives, they will be freed from the drudgery of learning or referring to complicated tables, all being superseded by one common measure of Tens, and no greater burden being imposed on the memory than the names or denominations of component parts, whether these be arbitrary, or bear a direct reference to their station in the scale.

With respect to Education, we are, notoriously, behind America, and inferior to many European nations. It is a melancholy fact that a very large proportion of our population can neither read nor write. It is certain that if we mean to hold our place in the first, or even in the second, rank of manufacturing nations, we must educate the people. Mr. Whitworth, one of the Royal

Commissioners to the New York Exhibition of Arts and Manufactures, was very much struck, during his tour through the States, with the superiority of American artisans to men of the same class at home. This he attributes entirely to their better education, which gives them, he says, an aptitude for doing every thing in the best possible way, their heads being always at work to devise improvements, and save labour. What a contrast to the great majority of our mechanics, who having no proper culture in youth, have, as men, little more intelligence or reflection than the machines with which, or on which, they labour.

The necessity of popular education is now universally admitted. The main difficulty in the way of it is the religious element, which amongst us, is, unhappily, a source of discord instead of the bond of peace and union. But here is a mode of facilitating education in which men of all religions may unite. It is as a labour saving machine of the first class that Decimal Reform has peculiar claims on the support of the working classes, and on that of the advocates of popular education universally, who ought to neglect no opportunity of pressing its advantages on the attention of the people, and that of the Government. Time was when the industrial classes of this country, rude and uneducated, set themselves against labour saving machinery, even to the extent of riot and bloodshed, fearing that it would be injurious to themselves. Happily they have become wiser, not through mere theory but from their own actual experience. They feel and know that labour saving machines of all kinds, by cheapening commodities, greatly increase consumption both at home and abroad, thus creating additional employment, and adding to their own comforts and conveniences at the same time. Labour, Capital, and Skill are requisite to these results. By the adoption of the Decimal System we shall greatly economise capital and labour by facilitating the despatch of business; and we shall extend skill by devoting to other branches of knowledge the time now wasted on a complex, difficult, and comparatively worthless system of Arithmetic. Here, then, is a labour-saving machine of the highest value and importance, having the strongest possible claims on the support of the working classes, the advocates of education, and the whole community.

Such being the question at issue, such the circumstances in which it is placed, and Government waiting to be coerced into the course which it knows to be the right one, what is it the interest and the duty of the people to do? Clearly it is to facilitate and expedite the proposed change by all the constitutional means in their power,—to encourage its advocates,—to increase their number,—to make the lukewarm energetic,—and to convert, by argument and conviction, the indifferent and the hostile into zealous and active friends. On a question of this nature it would be difficult, if not impossible, to excite anything like that popular enthusiasm which carried the Reform Bill, and changed Free trade, partially at least, from a disputed theory into a legislative fact; but neither from Parliamentary Reform nor from Free-trade have the people derived greater advantage individually than that which will certainly accrue to them, and to their children's children, from the adoption of a Decimal System of Money, Weights, and Measures.

Since this Reform is only to be effected, it seems, in any reasonable time, by popular agitation, let the people therefore agitate. Let them institute lectures, hold public meetings, advise with their representatives, and load the table of the House of Commons with petitions for its immediate adoption. Let them not be content with anything less than, or differing from, no matter how slightly, a purely Decimal System. Nothing less is worth the trouble and annoyance of a change from old habits and associations. As the national cry for Parliamentary Reform was "the Bill, the whole Bill, and nothing but the Bill,"—so the watch-word of all true Decimal Reformers should be, "Tens,—all Tens,—and nothing but Tens."

Her Majesty's Ministers have now, a second time, sought an excuse for official inertness in the allegation of popular prejudice and popular indifference. They may rest assured that on this question there is no ground for apprehending popular disturbance, or even popular dissatisfaction. On the contrary, it is certain that when the movement is successful, as successful it must and will be (for reason and truth cannot but triumph, ultimately, in the struggle with irrationality and error),—and when the great advantages of the new system over the old one are made manifest in every man's daily experience, the originators of that movement, and those who shall bring it to a triumphant issue will take a rank amongst the benefactors of their country not inferior to that occupied by the champions of Parliamentary Reform and Free trade,—if it be not even a higher one, since the measure which they carry will, in addition to its many other advantages, include a great extension of that universal blessing—popular education.

The Government of Lord Alderdeen unwisely missed the opportunity of securing this claim upon a nation's gratitude, which obtained, would have thrown all its demerits into the shade;—the Government of Lord Palmerston, if it be wise, will not suffer the honor of achieving such a reform to pass to its successor.



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